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EDITORIAL

Agricultural Reconstruction After the War. At a conference held by the Division for the Social and International Relations of Science in March this year under the chairmanship of Sir John Russell, a number of papers regarding the Agricultural problems of the post-war world were read and discussed by men from many different countries, who had an intimate knowledge of these problems.

The problems, difficult enough after any war, were increasingly so this time owing to the occupation of vast agricultural areas by the Nazis and the scorched earth policy pursued by the Russians as a war measure. The main post-war problem is, of course, the rehabilitation of agriculture in areas of Europe, where cultivation has been rendered impossible, owing to the destruction of seeds, implements, fertilisers and livestock. The restocking of these essentials immediately after the war—a stupendously difficult task—is the first step. The next is to have a co-ordinated plan of national economy in the different countries including Great Britain, which will ensure for the European population a decent standard of living. The agricultural policy to be pursued in Europe after the war according to the consensus of opinion among those who assembled in the conference, should aim more towards providing the highest possible standard of nutrition to the people of Europe than make the continent self-sufficient with regard to food stuffs, a plan favoured by the Nazis in order to establish an immunity against blockade in future wars. The Nazi policy, according to Sir John Russell, involved the extension of grain production and consequently lowered standards of life. The policy advocated by the conference was the intensification of agriculture for the production of a part of the grain and fodder requirements abroad. This policy also involved employment of more labour per unit area than is required for grain production.

It was emphasised among other things that a purely economic solution was inadequate; that the individualism of the farmer must be maintained at all costs, and the mystical relationship existing between the peasant and the land-lord should on no account be disturbed; farming should be made a profitable occupation instead of being a mere means of livelihood.

Though the conference dealt mainly with problems of agriculture concerning Europe, the conclusions aimed at are of far reaching importance to all the countries of the world. India which depends on agriculture as her mainstay needs must adjust herself to the changing circumstances in the Agricultural World. The war has not left her unaffected. Considerable alterations in her national economy are bound to be effected after the war. The demand for her raw materials such as cotton and groundnuts, may remain the same as in the pre-war period, but she may have a surplus of certain commodities the increased output of which has been necessitated by the exigencies of war. Her internal supply for protective food such as those which supply the vitamins and minerals are hopelessly inadequate to meet her nutritional requirements. Nor can it be said that the grain crops and fodder are efficiently cultivated and properly distributed. Farming is at best a precarious means of livelihood, and is not at present, as it should be, a profitable occupation. Transport and marketing facilities should be improved and organised on a rational plan.

It is therefore necessary in order to avoid the evil effects as those which followed the last war, that India should wake up betimes, and formulate a co-ordinated plan of agricultural economy on an All-India basis which will devise ways and means for the betterment of the agricultural prosperity of this country. We urge the Imperial Council of Agricultural Research to take up the initiative in the matter, and in consultation with the provinces, formulate proposals for establishing agriculture as a profitable industry in India, after the termination of the war.

Some Factors Governing Fruit-bud Formation in Mangoes (*Mangifera Indica* Linn.)

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Introduction.

That the production of profitable crops of marketable size and quality is the end-result of a long series of factors is a well established fact. Broadly, these factors can be classified under two groups—one, which is partially or completely under the control of the grower and another, which is not. The latter group comprises of mainly a complex series, which can be conveniently summarised under the heading of climate or season, and which may directly or indirectly exert a determining influence upon crop size. Even though this group of factors is beyond the control of man, it is possible to establish significant correlation between each of the factors constituting this group and the tree-performance, and thus obtain a precise knowledge of the optimum cultural practices in relation to the various types of tree-requirements as modified by this group of factors.

In the chain constituting the other group of factors, there are undoubtedly numerous links to be considered. This group of factors demands special care of the grower, as by a proper understanding of the influence of some or all of these factors it is not only possible to ensure better crops in normal years, but it may also enable the grower to reduce or minimise the losses resulting from unfavourable conditions not directly or easily controllable.

Realisation of the above stated fundamental facts has been primarily responsible for a long series of investigations on many fruits in many parts of the world. All these studies are, in effect, designed to supplement horticultural field experiments by studies aimed to furnish a better understanding of the tree processes. One of the simplest and most convenient methods of obtaining a full understanding of the tree-performance and the various cultural practices that are required to be adopted for optimum production, is through the establishment of a set of definite relationships between certain readily distinguishable growth features and tree-productivity. As in all other agricultural sciences, orchard practices must be based on the correct understanding of the plant growth and production; and the aim of all investigational work in horticulture should be mainly to place at the disposal of the grower, information to bring about in the tree the optimum set of growth conditions which are associated with profitable crop size and quality. To achieve this objective a detailed study of the growth processes of the tree is obviously essential.

Between the two groups of factors stated above can perhaps be placed the genetic make up of the tree. Regulation or improvement of the inherent productivity of the tree is a work beyond the scope of short investigations as those under report. However, attempt has been made, on the basis of certain preliminary blossom biological and pollination studies to throw some light on this question also. But the present studies are mainly directed towards an understanding of the growth processes of certain commercial varieties of mangoes at Kodur and the relationship between some of these features and flower-bud formation.

I. Studies on Certain Aspects of Growth.

Introduction. An attempt is made to present data on the peculiar growth features that characterise a few of the South Indian commercial mango varieties. At the same time data are adduced to present the characteristic features of growth in the various parts of the tree and in respect of those parts which have had different kinds of performances in the preceding season. The age of the tree parts has also to be necessarily given due consideration while evaluating their performances. In short, the studies reported upon in this paper are aimed to bring forth the mango tree growth in all its varied forms and patterns, as a step for further elucidation of the main problem of fruit-bud formation.

Material and methods. A grafted mango plantation at Kodur containing trees of about 20 years of age was selected in August 1936 for this study. The study was in progress till January 1940.

Growth features of all shoots. For the study of certain easily distinguishable growth features, four of the important commercial varieties of mango in this tract, viz., *Neelum*, *Bangalora*, *Baneshan* and *Mulgoa* were chosen. For one of the investigations, only four bearing trees in each of *Neelum*, *Bangalora* and *Baneshan* varieties, which appeared uniform looking in tree vigour and health were selected. About 20 to 25 healthy looking shoots situated on all sides of the tree were selected at random in August 1936 and tagged. Every month, from August 1936 to March 1939, the number of new shoots produced on these selected shoots were tagged and their extension growth recorded.

Growth features of different classes of shoots. Observations were carried out on the shoots, irrespective of their nature, origin and previous performance. In order to throw light on the growth features of the various classes of shoots commonly met with in mango trees, it was decided early in 1939 to record the growth measurements of each class of shoots separately. With this end in view the following six classes of shoots were chosen from three trees in each of the three varieties, *Neelum*, *Bangalora* and *Baneshan*, in March 1939, when new growth was just commencing for that year. The number of shoots tagged was 60 to 75 in each class or 360 to 450 in all classes per variety, with a minimum of 20 in each class per tree.

1 and 2—Leaders and laterals of 1938 that failed to flower in 1939 (referred to subsequently as "non-flowered leaders" and "non-flowered laterals" respectively).

3 and 4—Leaders and laterals of 1938 that flowered in 1939 (referred to subsequently as "flowered leaders" and "flowered laterals" respectively).

5 and 6—Leaders and laterals of the first flush of 1939 (referred to subsequently as "current year's leaders" and "current year's laterals" respectively).

Besides these, 30 shoots of each of the six classes mentioned above from a *Mulgoa* tree and 41 leader shoots of *Neelum* from two of the trees included under the above mentioned investigation and which carried fruits to maturity during 1939, were labelled separately in July and October 1939 respectively for observation.

As shoots giving rise to inflorescence from the apical buds are incapable of producing extension growth from the same region, it will be clear that, the leaders of the first flush of 1939 are those that were produced by the leaders or laterals of 1938 which failed to flower in 1939. In order to make the current year's growth selected for observation representative of all classes of shoots on which they originate, care was taken to select the leader shoots of the first flush of 1939 in fairly equal numbers from each of the non-flowering batch of leaders and laterals of the previous year and also to select the laterals in equal numbers from each of the four classes of shoots of the previous year.

The second investigation was commenced in March 1939. During each of the subsequent months up to January 1940, length measurements of the new growths made on all classes of shoots were taken individually at a definite interval of a month, and the extension growth produced in each month on each class of shoots was thus obtained. At the same time new leaders and laterals produced were tagged and measured.

Season and duration of growth. Observations made from August 1936 to January 1940 on *Neelum, Bangalora* and *Baneshan* have shown that, as a general rule, growth in these three varieties during a calendar year is characterised by two distinct active phases; one occurring from February to June, and another from October to November. Minor growth flushes have also been seen to occur in some varieties, as for example in *Baneshan*, in December 1939. The relative amount of extension growth made during a given period, and consequently, the time of growth cessation have, however, been found to vary to some extent between the varieties during the period under review.

Differential behaviour of varieties to seasonal conditions. The mean extension growth made by the three varieties from 1937-38 to 1939-40 is given in Table I. It is clear that the varieties do not differ significantly from each other, while the seasons do. The data further show that there is no definite cyclic growth from year to year, since in all the

varieties the latter two years have shown significantly less extension growth than the former year; and between the latter two years there is no significant difference in any of the three varieties.

Number of new shoots formed. The production of blossoms may be governed not only by the amount of extension growth made but also by the number of new shoots produced. In Table II are presented the total number of new shoots produced by the three varieties during 1937-38 and 1938-39. It is seen that *Neelum* has produced a significantly higher number of new shoots than either *Bangalora* or *Baneshan*, and that the number of shoots is definitely larger in the latter year than in the former in all the varieties.

Growth features of different classes of shoots. The above inferences relating to the growth features of the varieties have been drawn from a consideration of all classes of shoots. Observations made on the growth produced by the different classes of shoots have shown that they are possessed of varying features. In particular, the features in respect of which the different classes of shoots in the same variety differ markedly from each other are enumerated below :—

1. Number of flushes produced in the year.
2. Month in which the peak of extension growth of the first flush occurs during the year.
3. Month of cessation of growth of the first flush in the year.
4. Number of lateral shoots produced in the year.

The total number of shoots produced per 100 selected shoots of each of the six different classes in four different varieties has been statistically analysed and presented in Table III. The following additional inferences may be arrived at from these data.

(a) The number of lateral shoots produced per hundred selected shoots varies very significantly between different classes of shoots in the same variety, but not significantly between varieties.

(b) The flowered shoots have produced a significantly higher number of lateral shoots than the non-flowered ones or current year's shoots. The leaders have produced also a significantly higher number of laterals than the lateral shoots.

(c) The current year's shoots and non-flowered laterals appear to be relatively unimportant in lateral shoot production.

Growth features of shoots that carried fruits to maturity and of those that shed the flowers. The data collected during 1939 on 41 leader shoots of *Neelum* that carried fruits to maturity in 1939 and on 75 leader shoots of the same variety which had flowered but had subsequently shed the panicles completely before fruit setting, are presented in Table IV.

It is observed from these that the shoots carrying fruits to maturity have shown lower extension growth during 1939 and new laterals on a smaller

proportion of shoots during that year than those in which the flowers had shed early. The longest lateral shoot on the former class of shoots was only 5·8 cm., while that on the latter class was 19·6 cm.

The above facts throw some light on an interesting aspect of the problem of "off" and "on" year bearing in mangoes It will be shown in a separate paper that the optimum factors for productivity in mangoes are, among others, a good crop of lateral shoots and a medium amount of extension growth in the season previous to flowering. The shoots carrying fruits to maturity are, therefore, considered to be comparatively valueless for producing a crop of flowers or of fruits during the succeeding season, because of low extension growth and the failure of a large number of shoots to produce new lateral shoots. The shoots in which flowers shed early, producing as they do, a much larger number of shoots of relatively better extension growth, are consequently possessed of better flower bearing potentialities. It will also be shown later that the current year's growth on the former class of shoots have borne no panicles in the succeeding season, whereas those on the latter class have given rise to some crop.

In effect, the latter class of shoots behaves like artificially de-blossomed shoots; the only difference being that in one case de-blossoming has occurred as a natural phenomenon, while in the other by the agency of man.

Summary and conclusions. Annual growth in *Neelum, Bangalora* and *Baneshan* varities of mango is characterised by two distinct active phases, one occurring from February to June and another in October—November. Minor growth flushes also occur in some varieties mainly in December. The relative amount of extension growth, the peak of the growing season, the duration of the growing period, and consequently the time of growth cessation vary to some extent between varieties from season to season or in the same season.

The varieties under study do not show any cyclic growth tendency from year to year.

Different classes of shoots are possessed of different growth features; therefore, each of these shall have to be treated as independent entities for a study of their performance.

Previous performance and origin of the shoots have a determining influence on the production of laterals.

Shoots that carry fruits to maturity in one year produce a much lower extension growth and new laterals on a smaller number of shoots in the same year than those which failed to flower in the year or in which the flowers had shed early in that year.

As has been indicated already, the data presented above, though by themselves may be informative, are likely to be of little practical value if the relation between these various growth features and blossom-bud formation is not established or indicated. This forms the subject matter of the next paper in the series.

TABLE I. The mean extension growth made by three varieties of mango from 1937–38 to 1939–40.

Serial Number.	Variety.	1937–38	1938–39.	1939–40.	Total.	Mean.
1	*Neelum*	31	5	9	45	15·0
2	*Baneshan*	30	4	10	44	14·7
3	*Bangalora*	29	18	6	53	17·7
	Total	90	27	25	142	General Mean
	Mean	30·0	9·0	8·3		15·8

Difference between varieties (for P = ·05)—Not significant.
Do. years do. —Significant.
Standard error of difference between any two means for years = 4·4
Critical difference (P = ·05) = 12·3.
Conclusion. 1937–38 1938–39 1939–40.

TABLE II. The number of growths produced (as percentage of selected shoots) on the three varieties during 1937—38 and 1938—39.

Variety.	1937—38.	1938—39.	Total.	Mean.
Neelum	474	708	1182	591
Bangalora	370	554	924	462
Baneshan	364	540	904	452
Total	1208	1802	3010	
Mean	402·7	600·7	General Mean—501·7	

Difference between varieties (for P = ·01)—Significant.
Do. years do. — do.
Standard error of difference between any two means for varieties = 17·9
Critical difference (P = ·01) = 104·5
Conclusion. *Neelum* *Bangalora* *Baneshan*

TABLE III. The number of lateral shoots produced per 100 selected shoots in each of the six different classes in four varieties.

Varieties.	Laterals produced by						Total.	Mean.
	Non-flowered		Flowered		Current Year's			
	Leaders.	Laterals.	Leaders.	Laterals.	Leaders.	Laterals.		
Neelum	71	23	143	130	16	5	388	64·7
Bangalora	29	20	145	36	—	—	230	38·3
Baneshan	55	—	89	56	28	21	249	41·5
Mulgoa	17	13	107	77	—	—	214	35·7
Total	172	56	484	299	44	26	1081	
Mean	43·0	14·0	121·0	74·8	11·0	6·5	General Mean—45·04	

Difference between Varieties (for P = ·05)—Not significant.
" " Leaders and Laterals (for P = ·05)—Significant.
" " Flowered and non-flowered shoots (for P = ·01)—Significant.

TABLE IV

The proportion of growing shoots in and mean extension growth made by leader shoots of *Neelum* that shed flowers early and those that carried fruits to maturity.

Class of Shoot.	Number tagged.	Number producing laterals.	Percentage.	Total mean extension growth for the year (Cm.)
Shoots that shed flowers early	75	54	72	14·54
Shoots that carried fruits to maturity	41	8	20	1·04

Acknowledgments. During the period of about four years when this investigation was in progress, the authors have had the valuable assistance of the late Sri P. Parthasarathy, then Farm Manager, Fruit Research Station, Kodur, for a time. A portion of the data presented in this paper formed a part of the thesis submitted by the junior author to the University of Madras for the M. Sc. degree. The authors wish to record these facts with gratitude.

Groundnut as Human Food.*

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Food constituents. The food-stuffs that we consume should contain the right amount and kind of proteins, fats, carbohydrates, vitamins and mineral salts, if we are to live in normal health and our body is to function properly. Each of these ingredients supplies some requirement or other of the body complex. Proteins are necessary for building the muscles; carbohydrates are the body's chief source of energy; fat is the heat producer while mineral salts and vitamins play an important part in the physiological functions. Any one food-stuff that is available to man may not contain all the above ingredients, so that by consuming one particular product we cannot supply the full requirements of the body. Therefore, we must combine them judiciously so that our daily diet contains all these essential ingredients in the right proportions.

The South Indian diet. The South Indian diet which usually consists of a large quantity of highly polished rice and only very small quantities of *dhal*, grams, vegetables, milk, etc., is rich only in carbohydrates. It is deficient in other requirements of the body, especially proteins which are so essential for muscle building. To remedy this defect we have to include in our rice diet adequate quantities of other food-stuffs that supply these deficiencies but at the same time are cheap and within easy reach of even the poor.

Food value of groundnuts. Groundnut which is produced in abundance in our Province is widely acknowledged as a rich and cheap source

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of vegetable protein and if included in our daily diet will supply the protein deficiency economically. The table given below compares groundnuts with some of the common protein foods.

Food value of some common protein foods.

	Percentages.			Calorific value.
	Protein.	Carbo-hydrates.	Fat.	
Milk (Cows')	3·3	4·8	3·6	65
Eggs (Fowl)	13·3	...	13·3	173
Mutton	18·5	...	13 3	194
Beef	22·6	...	2·6	114
Redgram (*dhal*)	22·3	57·2	1·7	333
Groundnut	25—33	10—20	40—50	500—600

It may be seen that the protein content of one ounce of roasted groundnut is nearly as much as that of $1\frac{1}{3}$ oz. of *dhal*, $1\frac{2}{3}$ oz. of mutton, $2\frac{1}{2}$ oz. of eggs, or 8 oz. of milk. On the basis of protein content alone, to secure that amount of protein which is contained in one anna worth of groundnuts, one will have to spend about 3 annas for *dhal*, $4\frac{1}{2}$ annas for mutton, 10 annas for eggs, and 12 annas for milk. These show clearly that groundnut is a rich and cheap source of protein.

Nutrition experts state that "groundnut is also rich in phosphorus, and contains some of the B vitamins, notably B_1 and an important member of the B_2 group, nicotinic acid, in fair amounts. Its high fat content makes it a concentrated food with a high caloric yield per unit of weight. In the case of the under-as well as mal-nourished, any supplement which increases their total food intake would be of value."

However, it would be difficult to take groundnut as the principal ingredient in the diet. Eaten in large quantities, it tends to be nauseating, probably due to the high oil content. This can be overcome by eating it in smaller quantities and preferably mixed with jaggery or cereal foods. Cooking or artificial grinding is said to increase its digestibility.

Consumption in India. Even though groundnut is recognised as a palatable "poor man's nut", and is eaten and relished by almost all classes of people, its consumption in India has not kept pace with the increase in its production. This is chiefly due to the fact that there is no organised agency for the regular supply of edible groundnuts or for processing it for consumption. At present it is eaten only casually whenever it becomes available and that mostly as raw or roasted groundnuts. The *per capita* consumption of groundnuts in India is estimated to be about $\frac{3}{4}$ lb. of kernels. This is almost negligible when compared to the consumption of groundnuts elsewhere, parficularly in the U. S. A. where it has become a regular article of diet and forms a popular item in the daily menu of American homes.

Factories for grading and processing groundnut for edible purposes have sprung up in many parts of America. A large quantity of groundnut is consumed in the roasted form or as "salted peanuts", "peanut butter", "peanut candies", "peanut brittle", etc. Of these "peanut butter" has become a regular article of consumption and is produced on a factory scale and marketed.

Likewise the consumption in India can be increased to the advantage of both the consumer and producer alike. Below are given a few methods of preparing groundnut for consumption in Indian homes which may satisfy the varied tastes. Most of them, particularly the Indian recipes, are familiar to many, and simple and easy to prepare.

Indian Recipes.

1. *Groundnut chundal.*

1 Madras measure freshly harvested groundnut pods
2 spoonfuls salt
½ ollock oil
1 spoonful mustard
3 or 4 dry chillies and a few curry leaves

Wash the pods well and boil in salted water till the kernels are well cooked. Drain off the water and remove the shells. Pour oil in a pan, add mustard, chillies and curry leaves. When fried add the cooked kernels, fry for a few minutes and remove.

2. *Salted groundnuts.*

½ Madras measure groundnuts (kernels)
1 ollock oil.
A little salt

Slightly roast the groundnuts over a slow fire, remove skin. Have the oil well-heated in a pan. Fry the kernels a handful at a time. Spread on a piece of paper so as to remove extra oil. Sprinkle with salt and serve. If desired a little chilli powder may be added with the salt.

3. *Groundnut mixture.*

1 cup blanched* groundnuts
½ cup roasted Bengalgram (*kadalai*)
¼ cup roasted greengram
¼ cup fried rice
¼ cup copra chips
¼ ollock oil
A little salt and chilli powder

Pour oil into pan, heat, add the blanched kernels first and then the other ingredients. Add chilli powder and salt. Mix well, remove and serve.

4. *Groundnut chutney.*

½ cup blanched groundnuts
8 chillies
2 spoons coconut scraped
A little tamarind
A little asafoetida
Coriander leaves
Salt

Slightly roast the chillies, asafoetida and coriander leaves. Grind all the ingredients together and serve with *iddali* or *dhosai.*

* Blanching groundnuts is done by roasting the kernels and removing the coloured seed coat by rubbing, and also the tiny bud (germ).

5. *Groundnut pakoda.*

1 cup groundnuts slightly roasted and blanched
2 table-spoons Bengalgram flour
1 table-spoon rice flour
1 Ollock oil
A pinch of chilli powder
Salt

Mix the Bengalgram and rice flour. Add a little salt and chilli powder and make into a frying batter adding water. Heat the oil in a vessel and when well-heated, put in the groundnuts after first dipping them in the batter. Fry to a golden brown, drain and put on a piece of paper to remove the extra oil ; serve hot.

6. *Groundnut toffee.*

1 lb groundnut blanched
1¼ lb. jaggery
1 table-spoon ghee or butter
1 cup water

Melt the jaggery in a deep pan adding the water. Allow to boil and then simmer stirring occasionally. When the syrup is ready i. e., when a little dropped in water hardens, add the butter or ghee and nuts stirring well. Turn the mixture at once into well-greased pans and cut into squares while hot.

7. *Groundnut toffee* (another method).

1 lb. groundnut blanched
1 cup roasted rice flour
½ cup copra chips if available
1½ cups water

Melt the jaggery with the water in a deep pan. Bring it to the boil and let it go on simmering until a little hardens when dropped in cold water. Add the groundnut, rice flour and copra chips stirring well. Spread the mixture in well-greased plates and cut into squares while hot.

8. *Groundnut balls.*

2 cups groundnut blanched
1 cup roasted *ragi* flour
1 cup gingelly seeds cleaned and roasted
1 lb. jaggery

Pound the jaggery in a mortar. Add the groundnuts and pound well. Next add the roasted gingelly seeds and *ragi* flour and pound thoroughly. Make this into small balls and keep for use.

American Recipes.

1. *Peanut soup.*

1 quart milk
2 table-spoons flour
2 table-spoons butter
1 cup peanuts

Cook peanuts until soft; remove skins, mash or grind until very fine; milk come to a boil; add the peanuts, cook 20 minutes. Rub flour into a smooth paste with milk ; add butter to the peanuts and milk ; stir in flour; season with salt and pepper to taste ; serve hot.

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* Extracted from a bulletin entitled " How to grow the peanut and 105 ways of preparing it for human consumption " by George W. Garner, published by the Experimental Station, Tuskegee. Normal and Industrial Institute, Alabama, U. S. A.

Note. Unless designated otherwise, the groundnuts used should be blanched. Blanching is done by roasting the kernels and removing the coloured seed-coat by rubbing and also the tiny bud or germ inside.

2. *Peanut tars.*

2 cups flour	½ cup milk
½ cup sugar	2 table-spoons butter
1 cup coarsely chopped peanuts	1 table-spoon baking powder
1 egg	Pinch of salt

Sift flour, salt, and baking powder into a bowl; rub in the butter, nuts and sugar; mix to a rather stiff dough with the egg and milk; turn on to a floured board, and roll out two thirds of an inch thick; cut into bars of convenient size, and fry in the fat until golden brown.

3. *Peanut wafers.*

1 cup flour	1 cup sugar
¼ cup butter	1 egg
1 cup blanched nuts	

Grind or roll the nuts; stir into butter; drop on buttered tins, and bake quickly.

4. *Peanut muffins.*

½ cup chopped peanuts	½ pint thick sour butter-milk
2 eggs, beaten very light	½ tea-spoon salt
½ tea-spoon soda, dissolved in a table-spoon of water	½ cup flour, or enough to make a stiff batter.

Add soda to the sour milk; stir well; make the batter quickly; when ready to drop into the pans add peanuts; bake in a quick oven from 20 to 25 minutes.

5. *Peanut doughnuts.*

2 eggs, beaten light	1 salt-spoon salt
1 cup sugar	1 salt-spoon cinnamon
1 cup sour milk	3 table-spoons melted butter
½ tea-spoon soda	1 cup finely ground or chopped peanuts
4 cups flour	

Into the well-beaten eggs stir the sugar, butter, milk and nuts; add flour to make a dough just stiff enough to roll out; roll, cut out and fry in deep fat hot enough for the dough to rise at once.

6 *Peanut cake.*

¼ lb. butter	4 eggs (whites only), well beaten
2 cups flour	¾ cup water
1 cup finely ground peanuts	1 tea-spoon baking powder

Beat the sugar and butter to a cream; add the water and flour; stir until smooth; add half the well-beaten whites, then the nuts, then the remainder of the whites and the baking powder; pour into square, flat pans lined with greased paper to a depth of three inches, and bake in a moderate oven for 45 or 50 minutes.

7. *Peanut cake.*

9 ounces flour	1 tea-spoon vanilla
4 ounces butter	¼ tea-spoon salt

4 eggs
1 tea-spoon baking powder
4 ounces chopped peanuts

Sift flour, salt and baking powder together; cream the butter and sugar; add the vanilla, chopped nuts, yolks of eggs well beaten; add flour, then whipped whites, and beat well; bake in shallow pan in medium oven; when cold, ice with boiling icing.

8. *Peanut and cheese roast.*

1 cup grated cheese
1 table-spoon butter
1 cup bread crumbs
Juice of half a lemon
1 tea-spoon chopped onion
Salt and pepper to taste
1 cup finely ground peanuts

Cook the onion in the butter and a little water until it is tender. Mix the other ingredients, and moisten with water, using the water in which the onion has been cooked. Pour into a shallow baking dish, and brown in oven.

9. *Peanut omelet.* Cream a slice of bread in half a cup of rich milk; beat the whites and yolks of two eggs separately; add the yolks to the bread crumbs and milk; to half a cup of finely ground peanuts add a dash of pepper and salt; mix thoroughly; fold in the whites, and cook as usual in a buttered pan.

10. *Peanut macaroni and cheese.*

1 cup broken macaroni
1 cup coarsely ground peanuts
1 cup rich milk
¼ to ½ pound cheese
2 table-spoons flour
½ tea-spoon salt
2 quarts boiling salted water
A dash of cayenne pepper

Cook macaroni in the boiling salted water; drain in a strainer, and pour cold water over it to keep the pieces from sticking together; mince cheese, and mix with all other ingredients except macaroni; put sauce and macaroni in alternate layers in well buttered baking dish; cover with butter crumbs, and bake slowly until crumbs are brown.

11. *Peanuts and mushrooms.* Cook 2 table-spoons of chopped onion and ½ cup chopped fresh mushrooms in 4 table-spoons of butter for five or six minutes; stir in 2 table-spoons flour, a little salt and pepper, and 1½ cups milk; cook and stir a while for five minutes longer; then add one cup of finely chopped peanuts; reheat and boil slowly for 10 minutes; serve on squares of buttered toast.

12. *Peanut Timbales.*

½ pint of peanuts cooked until soft in salted water; drain and mash
2 well beaten eggs and two cups thin cream, added to the nuts.
½ tea-spoon of salt, and a dash of pepper.

Turn into custard cups; put the cups in a basin; surround them with boiling water; cover the tops with buttered paper, and bake in a moderate oven for 20 or 25 minutes; then mould and serve with a little cream sauce poured around them.

13. *Peanut butter.* Shell the peanuts; roast just enough so that the hulls will slip off easily; remove all the hulls by gently rolling, fanning and screening; grind very fine in any sort of mill, passing through several times if necessary; pack in cans, bottles, or jars, and seal if not for immediate use. Some manufacturers add a little salt and a small amount of olive oil; others do not, according to taste. For small quantities of butter a good meat grinder will answer the purpose. If the nuts are ground fine enough no additional oil will be necessary.

14. *Salted peanuts.* Roast the peanuts; shell and remove the thin hulls, put in a pan; butter slightly; put in oven and heat through; spread on piece of white paper, sprinkle with fine salt and serve.

Note.— If the nuts are very greasy allow them to drain before applying the salt.

15. *Peanut butter sandwiches.* Roast the desired number of peanuts; rub the thin hull off the nuts, grind or rub in a mortar until quite smooth and oily; salt to taste, and spread a thin layer between crackers, lunch biscuits, rolls or bread of that character. If the butter is not as thin as you wish, add a little fresh cow's butter, a little milk or water and rub well. This butter will not keep as well as when the milk or butter is left out.

16. *Peanut salad.*

1 small cabbage	1 cup vinegar
1 tea-spoon flour	1 tea-spoon butter
1 tea-spoon mustard	½ tea-spoon pepper
1 tea-spoon sugar	2 eggs
1 pint peanuts	2 tea-spoons salt

Chop cabbage and peanuts up fine; add the salt and pepper; cream the butter, mustard, sugar, and flour together; stir in the vinegar; cook in double boiler until stiff; add yolks of eggs; pour over nuts and cabbage, and serve.

17. *Peanut icecream.*

1 pint peanuts	1 pint cream
2 quarts milk	3 eggs
2 cups sugar	2 tea-spoons vanilla

Roast, shell, and roll the peanuts until they are quite fine; brown one cup of sugar and add to the milk; next add the remainder of sugar, the cream, vanilla, and lastly the peanuts; freeze.

18. *Peanut butter condy.*

2 cups sugar	½ cup milk
2 table-spoons peanut butter	

Blend together, boil for five minutes; remove from the fire and beat steadily until cool.

19. *Peanut candy.*

2 cups sugar	1 cup peanuts

Melt the sugar in a frying pan; melt slowly, stirring constantly until melted

butter a shallow dish, and cover bottom with the roasted and cleaned nuts; pour the candy over them; set aside; when cool break in pieces, and serve

20. *Peanut caramels*

1 cup sugar	1 cup butter
1 cup molasses	1 cup milk or cream
1 cup peanuts (ground)	

Cream sugar and butter; add molasses and cream or milk, stirring constantly; put mixture into a boiler and let boil, gently scraping the bottom to prevent burning (do not stir); let cook until it forms a soft mass when dropped into cool water; add peanuts and pour into buttered tins. The layer should not be more than $\frac{1}{2}$ an inch thick. Then cool enough, cut into small squares, and wrap in thin glazed paper.

21. *Peanut butter fudge.*

2 cups powdered sugar	2 heaped tea-spoons peanut butter.
1 cup milk	

Mix ingredients; boil vigorously for five minutes; beat; pour in a buttered pan, and cut in squares.

22. *Peanut brittle.*

1 cup roasted peanuts	3 cups granulated sugar
$\frac{1}{4}$ tea-spoon soda	1 scant cup boiling water

Melt all together over a slow fire; cook gently without stirring until a little hardens when dropped in cold water, add the nuts; turn the mixture in well buttered pans and cut while hot. Stirring will cause the syrup to sugar.

23. *Peanut and pop corn balls.*

$\frac{1}{2}$ tea-spoon soda	1 quart freshly roasted peanuts
1 pint syrup	2 table-spoons butter
3 quarts freshly roasted corn	1 tea-spoon vinegar

Cook until the syrup hardens when a little is dropped in cold water; remove to back of stove; add the soda dissolved in a tea-spoon of hot water; pour syrup over the corn and nuts, stirring until each kernel is well-coated; mould into balls.

24. *Peanut almond fudge.*

$1\frac{1}{2}$ cups sugar	1 table-spoon almond extract
1 cup milk	1 cup peanuts deeply browned but not scorched; crush or grind
1 table-spoon butter	

Brown $\frac{1}{2}$ cup sugar in a pan; add the milk; when the brown sugar is thoroughly dissolved add one cup of granulated sugar and the butter; boil to the soft-ball stage; flavour with the extract; add the peanuts; beat until creamy; pour into buttered tins, and mark off into squares.

25. *Peanut puffs.*

1 cup cream	1 egg (white)
3 cups sugar	1 cup ground peanuts
$\frac{1}{4}$ cup honey	

Boil the cream and sugar (without stirring) until the threading stage is reached; add the honey; when syrup will make a soft-ball when dropped into cold water, remove from the fire and beat into it the well-whipped white of an egg; add the nut-meats; when firm and creamy whip into balls.

26. *Peanut carrot fudge.*

1 cup carrot pulp	1 table-spoon butter
1 cup corn syrup	1 lemon
2 cups sugar	1 orange
½ cup peanut meal	1 tea-spoon vanilla or almond extract

Bake some nice, yellow carrots until tender; pass through a sieve; to a cupful of this pulp, add all the ingredients except the extract; pour into buttered pans, and when cool cut into cubes; use both the juice and half the grated peel of the lemon and orange.

27 *Peanut coffee.*

½ cup peanuts	½ cup wheat
½ cup cowpeas	

Roast all to a rich coffee brown, grind and make as for postum. To those who like a cereal coffee, this will be quite acceptable, even delicious. To more or less habitual coffee drinkers, one-third or one half real coffee will make the above recipe more acceptable.

28. *Salted peanuts.* Parch, rub and winnow out the brown hulls; put in pan with just a speck of butter; heat gently, shaking all the time; when buttered sprinkle with fine salt.

Note. The above recipes are only a few of the many ways in which this wholesome nut can be prepared for human consumption.

Maintenance of Purity of *Cumbu* Strains under Large Scale Seed Multiplications.

By M. A. BALAKRISHNA IYER, L. Ag.,
District Agricultural Officer, Tinnevelly.

In no phase of agriculture there is greater need for careful planning than in the maintenance of the purity of the improved strains of crops during the course of their multiplication and distribution. It is more so in the case of crops which are mainly cross-fertilized. The criterion of the methods adopted should be such as to combine minimum cost with efficiency in ensuring against cross-fertilization with other varieties. Otherwise, costly methods of selfing followed in the seed nucleus plots would soar to a staggering amount when adopted for large scale seed farms. Lack of cheap and suitable methods for protecting the purity of the crop have all along proved a serious handicap for the rapid spread of high yielding *cumbu* strains in the black soils of the Tinnevelly District.

Cumbu flowers being protogynous are easily susceptible to out-crossing. Due to this feature of out-crossing with local inferior varieties the

cumbu strains distributed hitherto, have tended to degenerate in yield as well as in purity in the course of a few seasons. Much head way could not therefore be made in the distribution of the improved strains so far. So a definite method of plant isolation to ensure purity of the superior strains in the seed farms had to be devised for their rapid multiplication and distribution on a wider scale. The present note deals with the possible ways of attaining this object under large scale seed expansion.

Cumbu being essentially a cross-fertilized crop, the planning consists in locating the seed farm areas in the midst of the other two crops viz, cotton and fodder *cholam*, which are commonly cultivated in these black soils. The belt of cotton or fodder *cholam* crop around the *cumbu* strain grown can prevent cross-fertilization with the inferior varieties usually grown by the *ryots* elsewhere in the village. The system of crop rotation and zoning followed in the black soil area lends itself to easy control of out-crossing. The rotation in vogue is either of the two courses detailed below:

(i) *Cumbu* following cotton.
(ii) Fodder *cholam* following cotton or four course like, *cumbu*—cotton—fodder *cholam*—cotton.

Under the above system the *ryots* in a village co-operate and adjust their cropping in such a way that one portion of the village is relegated to *cumbu*, another to *cholam* fodder and a third to cotton. Such a procedure undertaken on a co-operative basis, enables them to have a common watch for the two crops at minimum charges during the cropping season, besides facilitating, sowing, harvesting and transporting at a particular time for each of the crops. It is in the midst of such cotton or fodder blocks in the village that the proposed *cumbu* seed farms will be run.

To ensure further purity a width of 10 feet all round the perimeter of the *cumbu* block will be harvested as outskirts. Stray rogues that may possibly be found will be weeded out. The produce from the central portion or the inner block will be harvested separately and reserved for seed. The above method of protection from cross-fertilization will reduce the cost of roguing to the minimum. A high degree of homogenity in the crop is assured as there will be only scope for inter-crossing between plants of the same variety or strain. The strain thus multiplied will be descendents of a single plant selected and isolated years ago.

The crop proposed to be multiplied is *cumbu* strain No. 8 evolved at the Agricultural Research Station, Koilpatti. It has been found to yield 10 to 15 per cent. more than locals in the Koilpatti Farm and in the trial plots. In the first year a block of five acres, will be raised as seed farm in each of the 'central villages' in the midst of cotton or *cholam* fodder zones. In the second year the produce from five acres will be distributed in the entire *cumbu* area of the village. Proceeding on the above lines seed farms in other villages will be organised and the seeds distributed till the entire

tract is flooded with the strain. At the same time a seed farm area of five acres will be continued in each of the 'central villages' year after year to meet any possible demand for the variety elsewhere in the tract. The project proposed thus envisages a rapid spread of the improved strain over the entire *cumbu* area of the tract in over 170,000 acres in the course of three or four years.

The millets section at Koilpatti had evolved a high yielding strain of *cumbu* about eight years ago, but due to the protogynous nature of the crop the strain could not maintain its purity and its performance was not as impressive as in the first year of its introduction. As soon as I joined duty at Tinnevelly as District Agricultural Officer, I was also confronted with the same problem of maintaining its purity. After serious study of the problem, I arrived at a practical solution and workable plan of getting over this difficulty. I drew up a scheme for the black soil area of the Tinnevelly District on the lines indicated above.

There are extensive areas of black soils in other parts of this and other provinces where similar strains suited to those areas could also be raised, their purity maintained and quantity multiplied.

My thanks are due to the Collector of Tinnevelly, Mr. V. S. Hejmadi, I. C. S. and to Mr. S. Sundaram, M. Sc., Senior Cotton Assistant at Koilpatti Research Station for the help rendered in this connection.

Grading of *Sathukudi* Oranges.

By T. K. VISWANATHAN, B. Sc. (Ag.),
(The Kodur Fruit Growers' Co-operative Society, Ltd., Rajampet).

The growers of *Sathukudi* oranges of Rajampet Taluk, used to send their fruits to Madras, from where The Madras Provincial Co-operative Marketing Society and other commission agents at Madras used to send the fruits to all mufussil stations. The Provincial Society grades the oranges as per size, viz. $3\frac{1}{2}''$, $3\frac{1}{4}''$, $3''$, $2\frac{3}{4}''$ and $2\frac{1}{2}''$, while other commission agents consign only the ungraded fruits to Southern districts.

It was more logical and economical to grade the fruits at the place of production and consign such graded fruits directly to the consuming areas. By this method one more handling at Madras would be saved, fruits would reach the consumer in a shorter period and consequently in a more fresh condition and it would be cheaper to get fruits directly from the production area. The aforesaid peculiarities drove the Kodur Fruit Growers' Co-operative Society to take up the grading of oranges in Rajampet taluk itself. With the co-operation of the Provincial Marketing Officer and the Registrar of Co-operative Societies, an Orange Grading Station was opened at Kodur on 1st September 1941 by Mr. S. Ranganathan, O, B. E., I. C. S., Collector

of Cuddapah. Since its inception the grading station had shown rapid progress and the following figures relate to its working :—

No. of months of working.	No. of oranges graded.					Total no. of fruits graded	Value of fruits graded. Rs.
	3½″	3¼″	3″	2¾″	2½″		
10	44716	146590	243675	111900	14891	501772	50486

With the steady increase in demand for graded oranges by all the mofussil co-operative institutions, merchants and individuals, it was found necessary to open two more grading stations, with the result that from 1st August 1942 three grading stations are working at Kodur, Reddipalle and Rajampet which form the important fruit growing areas and the following arrangement was made for the distribution of fruits :—

Orange Grading Station.	*Districts supplied.*
Kodur	Madura District
Reddipalle	Trichy and Coimbatore Districts
Rajampet	All other districts

The orchardists of different areas find it easier now to get their fruits graded as the three grading stations are located within their easy reach. From their experience the growers have realised the benefits of grading. They have come to know that graded fruits fetch a better price than a mixed lot, that fruits of higher grade (bigger size) command a higher price and that there can be no cheating as fruits are graded in their presence. If better returns are to be expected from the orchards steps should be taken to get a yield of uniformly big size fruits. This can be achieved only by proper manurial and irrigation practices. Prior to the introduction of the grading scheme, the wholesalers at Madras had a scope to make enormous deductions under the following heads, viz., undersized fruits, diseased and damaged fruits and shortage in transit, whereas now the producers have a clear and definite claim over the quality, size and the actual number of fruits. Incidentally it is interesting to note the proportion of different grades of fruits supplied from Rajampet Taluk. The averages for the past ten months given in the tabular form above, work out to 3½″—10%, 3¼″—31·5%, 3″—45%, 2¾″—15% and 2½″—2%.

Grading stations have also helped to regulate the prices. The rates are fixed according to demand and supply, with equal advantages to both the producers and consumers. Even the wholesalers at Madras have necessarily to follow the rates of the production area. The prevailing rates are easily disseminated amongst the growers. Every grower knows the favourable market conditions. Besides, even the growers who sell their standing crops in dire need of money are inclined to dispose of their fruits at a fairly reasonable price since they know the value of their crop judging from their knowledge of grading and the existing rates. Many of the growers were

till now ignorant and were not taking part in the actual marketing of their fruits since they were lacking in marketing technique and had no news about market conditions, and therefore were content to sell their fruits on the trees. 'Now the growers have come to know that marketing after all is not difficult. Only they have to get their fruits to the nearest Grading Station, and the Society grades their fruits and pays tha value. Even the fruit not selected, either because they were not of required size or because were of inferior quality are again sent to proper markets and the growers get the value for such fruits also. But complete success will be achieved only when the entire produce of the taluk is marketed through the Society. The Society has now captured more than one-fourth of the total Madras city and Southern districts markets and has marketed Rs. 1,47,112 worth of oranges during the year 1941—42. This is not a small measure of achievement considering that the Society has functioned only for five years since its inception. This augurs a bright future for the successful working of the Society.

So much for the advantages to the producers. The consumers have also equal benefits. They need not know the seller personally. They know that a particular grade approximates to a particular size. The buyer from a long distance places an indent on the producer by merely quoting the grade specification and he knows the nature of fruits he is going to receive.

The grading machine prepared by the Agricultural Research Engineer, Agricultural College, Coimbatore, is found to be cheap, simple and efficient, and helps to grade about six thousand fruits per hour without any damage to fruits. After grading the different grades are kept separately. From each heap selection is again made taking care to select only nice and thin-skinned fruits. The above two qualities are more or less an indication of good quality fruits. The selected fruits in each size of various members are pooled and then packed and despatched by order to various consuming centres under "AGMARK" labels

Grading by size alone cannot be said to sort the fruits by quality or by merit. For, size alone is not always an indication of quality, as there are instances where big size fruits are insipid. It therefore follows that there are greater possibilities of grading the fruits to a reasonable extent, by quality after analysing for sugar and acid values. This will mean a high level of quality, purity and quantity, and therefore a better value for the money. So for the prosperity and happiness of all the ideal of "BUY AGMARK" will be followed. The society will readily adopt quality grading as soon as a practical scheme is evolved.

The railway authorities have been kind to grant special concessional rates throughout South India for oranges from this taluk. The concessions given are quarter parcel rate over 300 miles and one-third parcel rate up to 300 miles.

The Society is an example to show that co-operation always pays the agriculturists. The growers are able to solve various difficult problems by adopting co-operative operating methods.

Gleanings.

Control of Alkali. The problem of alkali is encountered in comparatively few areas where intensive agriculture is practised. In eastern Canada the problem is more likely to be one of acidity than of alkalinity, and the same holds true on the Pacific Coast. In other areas of the province, however, land is being lost to cultivation as a result of the excessive concentration of alkaline salts. This holds true in some parts of the Okanagan Valley in British Columbia.

Pioneer work on the control of alkali has been done in California, Utah and Hungary. Other parts of the world have also helped to improve the control methods. In the Okanagan Valley a number of experiments have been conducted to determine the effectiveness of the control methods recommended in other countries. As a result of experiments the following recommendations are now being made by the Dominion Experimental Station at Summerland, B. C.

Some attempt should be made by growers on the higher levels to refrain from irrigating any longer than necessary at each application, so that the lower levels will not receive so much seepage water. Care should also be taken to prevent leaks in flumes and ditches. Seepage water not only prevents soil aeration, but also carries alkaline materials with it.

If the condition is still aggravated by seepage, it may become necessary to install a drainage system. This is especially true where the subsoil is impermeable. Without good percolation of irrigation water down through the subsoil it is difficult to control alkali.

Apply gypsum at the rate of three to five tons per acre. This supplies the necessary calcium in a fairly soluble form, and at the same time counteracts the alkaline condition. Application is preferably made in the fall. The one application should be sufficient for several years.

In the spring leach heavily, that is make an especially heavy application of irrigation water. This serves both to carry the harmful sodium out of the soil and to carry the calcium in. Each of the subsequent irrigations will help to accomplish the same purpose until by the end of a year a fairly definite improvement should be in evidence.

If the soil is tight, it may be opened up somewhat by a crop of sweet clover, which is comparatively tolerant to alkali. Alfalfa, though less tolerant, is better still where it can be grown. Roots of alfalfa that have been allowed to grow down for three or four years work wonders in the opening up of a heavy soil. —*Press Notes, Dominion Department of Agriculture, Canada.* (*Indian Farming*, Aug. 1942).

Cultivating the Tobacco Crop. The amount of cultivation given to the tobacco crop depends on the kind of soil on which the crop is grown, and on seasonal conditions. Experiments on Dominion Experimental Stations conducting tobacco investigations have shown that the primary purpose of cultivation is the control of weeds, although on heavier soils improved moisture relations and tilth are also important, says Dr. N. T. Nelson, Chief, Tobacco Division, Central Experimental Farm, Ottawa.

It is particularly important on the light, sandy flue-cured tobacco soils that the grower should exercise care in not overdoing the amount of cultivation. Physical condition and tilth are minor considerations on these soils, for as a rule they are easily kept loose and open. The maintenance of soil organic matter has been found to be a major factor in producing good yields and high quality

of flue-cured tobacco. Laboratory tests have shown that excessive cultivation tends to reduce the amount of active, readily decomposible organic matter of these light soils.

The important thing in cultivating is to prevent the growth of weeds, which if allowed to grow sap the moisture and fertility from the soil required by the tobacco crop. In this way judicious cultivation increases the efficiency of soil moisture and indirectly conserves it for crop use. Unnecessary cultivation, however, should be avoided on light soils.

Light flue cured tobacco soils usually require only three or four shallow cultivations to control weeds during the season. Heavier burley, dark and cigar tobacco soils, or poorly drained fields may need an extra cultivation to maintain good tilth. Care should be taken to avoid cutting the plant roots by too deep cultivation, especially at the last cultivation. Late season weed control is best accomplished with a hand hoe, thus reducing the possibility of spreading mosaic and cutting the tobacco roots The first cultivation after establishing a stand should be the deepest and most thorough.—*Press Note, Department of Agriculture, Canada. (Indian Farming*, Aug. 1942.)

Relationship Between Hardness of Sugar Cane and Varietal Resistance to the Beetle Borer. The beetle borer, or weevil borer (*Rhabdocnemis obscura* Boid.) is one of the most serious insect pests of the sugar cane in Queensland, and one of the most difficult to control. Various observations have indicated that cane varieties with hard rinds were less susceptible to borer attack than soft canes, which would suggest that the cane breeders should breed for rind hardness. The present work was undertaken to see whether the connection of hardness with borer resistance could be verified. Some connection was clearly indicated, and it was found that other factors also came into play. Since the beetles lay their eggs behind the leaf sheath, canes that are self-trashing give less opportunity for oviposition. Also, canes that are erect in habit of growth are less susceptible than canes that tend to lodge and give the female beetle better opportunity for egg laying It is further observed that canes affected with the top-rot disease carry higher borer populations and are much softer than healthy stalks under the same conditions, which is a confirmation of the conclusion that softness of cane and borer attack are directly related. This work also tends to dispose of two erroneous notions. One is that the sweeter canes are preferred by the borers. The other is that artifical trashing makes the stalk harder. This is not the case, but it is a fact that trashed cane gives the beetle less opportunity for egg laying. The author describes a simplified instrument for measuring cane hardness.—J. H. Buzzacott, in *Bureau Sugar Experiment Stations (Queensland) Technical Communications*, 1940, No. 8, pp. 127–152. (*Sugar*, July 1942).

A Central Bee-Keeping Research Station in India. We are glad to announce that at last we in this country are going to have systematic bee-keeping research carried out under government auspices. The Imperial Council of Agricultural Research have finally sanctioned the establishment of an All India Central Bee keeping Research Station at Jeolikote. We acknowledge the honour done to Jeolikote which is a recognition of the bee-keeping effort put in at this place during the last four years.

The scheme is to commence from April 1, 1943. A sum of Rs 25,700 has been sanctioned for the first three years. We have no doubt that the Centre will be continued if encouraging results are obtained during the initial period. It is obvious that for any reliable results to be obtained a much longer period of research work would be necessary.

We are grateful to the Imperial Council of Agricltural Research and congratulate it on the wise step taken. Bee-keeping and honey production have

been too long neglected in this country, the home of the honeybee. We are sure that this action of the I. C. A. R. will gladden the hearts of all true Bee Lovers throughout the country. (*The Indian Bee Journal*, Sept. and Oct. 1942.)

Bees and Pollination. Studies in the field of insect pollination of economic crops reveal that in commercial plantings natural pollinating insects are too few in numbers to insure profitable yields and that the only solution to the pollination problem is the introduction of hive bees.

Research data gathered in the Ohio fruit growing districts reveal that for best production yields it is necessary in the majority of cases for the orchardist to rent colonies to insure dependent insect population to pollinate his orchard. In all the surveys conducted in Ohio orchards it has been shown that the bulk of the pollinating activity was performed by honeybees. One colony per acre will render the most dependable pollination services for fruit growers.—*Gleanings in Bee Culture*, April 1942. (*The Indian Bee Journal*, Sept. and Oct. 1942).

Pollination. The unnumbered visits of the honeybee to help in the job of fertilization in the spring are a source of speculation that in part are answered by the experimental specialists who have approximated the number of bee loads of pollen carried to hive daily. One colony tested by special count was found to bring in 29,000 loads in a single day during fruit bloom to average 8,000 loads of pollen daily over the spring period.

The number of blooms visited by a single bee to gather a load of pollen is approximately eighty, so the benefit of pollination in orchard may be judged accordingly. It is possible for one colony of bees to send out visitors to 2,320,000 blooms a day. Think what three weeks work could accomplish in an apple orchard. If every pollination produced an apple, brother, what a pile of apples.

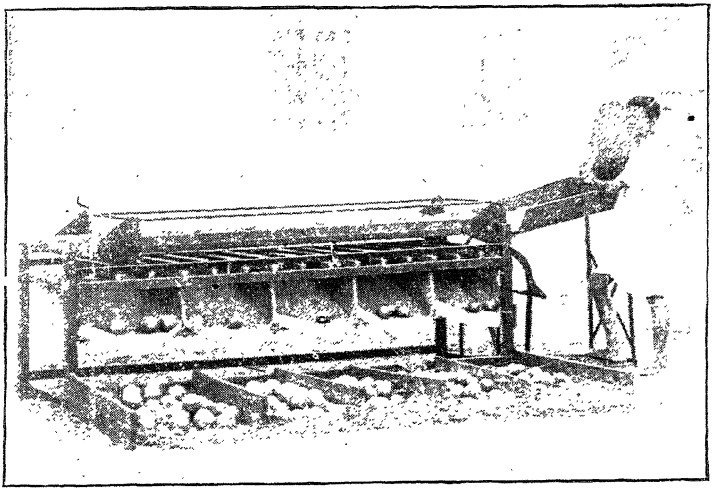
Yet I am sure that untold billions of blooms are visited by the bees and these visits produce results. Witness the 1941 crop of peaches in the South. —*American Bee Journal*, May 1942. (*The Indian Bee Journal*, Sept. and Oct. 1942).

History of honey. Honey commences its career as an infinitesimal drop of sucrose (cane sugar) and water in the flower, called nectar By the intricate processes, part occurring inside the body of the bees, this is converted into dextrose (grape sugar) and levulose (fruit sugar) which constitute roughly 70 per cent of honey. There are other constituents, viz., the essences of the flower, the scented oils and gum which give honey its flavour and bouquet. Less obvious but greater in bulk and much more important are a veriety of salts and minerals, iron, phosphorus, manganese, lime and sulphur, valuable because they are assimilable. The iron in numerous tonics, for instance, probably never gets into the human system at all. The iron in honey does. Then there are albumen, fats, waxes, formic and malic acids, nitrogenous pollen and last but not least, some very complex digestive enzymes capable of such useful feats as converting starch into malt.

"Chiefly honey is a food, the only food that requires no digestion and passes directly into the bloodstream It is a stimulant and a tonic. It has a strengthening effect on the heart and is a medicine for the liver. Its acids and salts make it a gentle laxative. It is a skin and hair food. It is a powerful antispetic also, when next you cut your fingure try applying honey as a bandage. The speed with which the wound heals will surprise you. If honey were nasty I believe more people would take it for its medicinal value. As it is honey is bought almost solely as a sweet".—John Compton, in *Readers' Digest*, April 1941. (*The Indian Bee Journal*, Sept. and Oct. 1942).

Vitamin B—1. The garden and florists magazines are chock full of the virtues of different hormones and vitamins in plant life and growth. No garden

The Orange Grading Machine.



"The Male Coconut Tree".

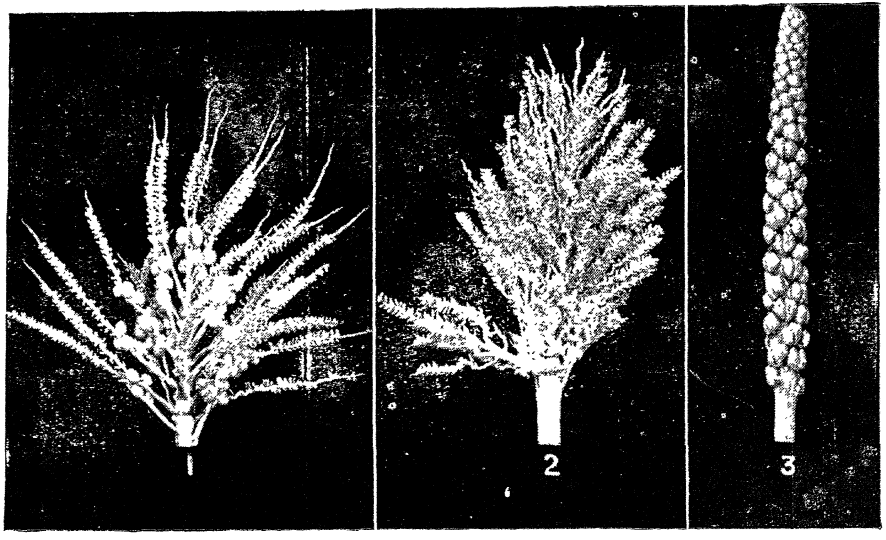


Fig. 1. Inflorescence of ordinary coconut $\frac{1}{14}$ N
„ 2. „ male coconut, $\frac{1}{14}$ N
„ 3. „ *Cocos nucifera* var. *spicata* $\frac{1}{11}$ N

development in years has created so much of a stir as Vitamin B-1. It makes roots grow. Plants previously not profitably propagated from cuttings have been made to form strong roots in two to four weeks. Shrubs, plants and even trees having their roots immersed in a B-1 solution can now be moved and established in even the hottest weather with seemingly no ill effects or set back.

In the past five years some fifty or more chemical substitutes for plant hormones have been found, most of them inexpensive products. One of the most recently discovered is honey. In careful tests on chrysanthemum and evergreen at the Ottawa Central Experimental Station last summer, experimenters stood the base of the cuttings for 24 hours in honey diluted with three parts of water to one of honey and the results were most successful. Other tests in the establishing of other plants and cuttings have produced like results. There are many factors which may influence the effect of the honey hormone in producing plant growth. This is yet in the experimental stage. Eventually it is believed this will open up another avenue for the sale of honey.—A. B. Silliman, Iowa, *American Bee Journal*, March 1942. (*The Indian Bee Journal*, Sept. and Oct. 1942.)

Research Note.

The Male Coconut Tree (*Cocos nucifera* Linn.) *

The ordinary coconut palm. The coconut palm belongs to the family Palmeae and the flowers are always unisexual, i. e., they are either male or female, but monoecious, i. e., both the male and the female flowers are borne by the same tree, and they are in the same inflorescence called the spadix (Fig. 1). Each branch of the spadix is an androgynous spike with one or more female flowers towards the base of the spike, the rest of it being covered with a large number of male flowers. Thus the ordinary coconut palm has both the sexes represented in the same inflorescence.

The male coconut palm. In the Kudlu village of the Kasaragod Taluk in the South Kanara District there are three rare coconut trees which are pure males, i. e., they always produce only male flowers and never any female flowers. Though they are about forty years old, they have never been known to have produced even a single female flower or nut in their life. To all outward appearances these palms are quite similar to the ordinary or the Tall variety of coconut palm. But the inflorescence (Fig. 2) is more robust with more spikes or branches and very many more male flowers than in the ordinary coconut palm. These flowers are larger in size than those of the ordinary palm, but the pollen grains are normal.

The most important feature of these trees is the complete absence of female flowers. The trees are, therefore, called male coconut trees. It will be waste of time and money to have the male trees in any garden, in view of the fact that plenty of pollen is available from the ordinary trees for purposes of normal pollination.

These barren trees may not be confused with the young palms of the ordinary variety which usually produce very few or no female flowers in the early years of flowering, but bear nuts normally as they advance in age.

***Cocos nucifera* Linn. var. *spicata*.** In this connection, mention may be made of the new variety of coconut, viz., *Cocos nucifera* Linn. var. *spicata* described by

* Contribution No. 21 of the Oilseeds Section, Madras Department of Agriculture.

Jacob, K. C. (*J. Bombay Nat. Hist. Soc.* 41, 906–907; 1940). This variety is quite distinct from the ordinary coconut palm in having no branches or spikes in the inflorescence (Fig. 3) and comparatively large number of female flowers and few male flowers. This variety clearly shows a greater expression of femaleness than the ordinary coconut palm. But no pure female coconut tree is as yet known to exist.

The following table gives the average number of male and female flowers in the coconut varieties mentioned above.

Number of flowers in the coconut varieties in one inflorescence.

Variety.	No. of spikes in the inflorescence.	No. of male flowers	No. of female flowers.	Ratio—male flowers: female.
Ordinary Tall	25—40	7,000	25	1 : ·0036 (normal)
Male coconut trees	200—350	14,000	Nil	1 : 0
Var. *spicata*	Nil or rarely one	150	600	0·25 : 1

From the above it is clear that there is tendency for the sexes in the coconut to develop towards dioecia, the sexes being confined to different trees. As dioecia may be considered higher in evolution than monoecia, and as plants have a tendency to advance higher in evolution, the occurrence of the male, or the female coconut tree like var. *spicata* may be considered natural.

C. M. John
and
G. V. Narayana.

Press Notes.

The position of food crops in the Madras Province and the efforts made by the Departments of Government to increase production.

The average area under all crops in this Province for the five years ending 1939-40 was 36·68 million acres, the maximum during this period being about 37 million acres in 1938-39 Roughly about 75 per cent of this area is devoted to food crops, the most important of them being rice. The other food crops grown are *cholam*, *cumbu*, *ragi*, *tenai*, *samai*, *varagu* and pulses.

The position with regard to each of these crops is as follows:—

(a) *Rice.* During the period 1936–41 the average annual production of rice of 47 lakhs of tons was below the average annual demand of 50·9 lakhs of tons for consumption in the Province. The average annual deficit of 390 thousand tons was met before the war by imports from Burma Siam and Indo-China. Besides, provision has also to be made for supplies to Ceylon, Travancore, Cochin and Bombay which depended largely on imports from Burma etc., and which now look to this Province for meeting at least a part of their large deficits for supplies; to Mysore and Hyderabad which usually depend on imports from Madras; and also for meeting the extra demand by the Military and the evacuees from Burma and other countries.

(b) *Wheat.* The province is heavily in deficit for wheat and wheat flour to the extent of about 80 thousand tons which is met by imports from North Indian Provinces. The production in the Province is only about 2,000 tons. There is no possibility of increasing production to any appreciable extent.

(c) *Millets.* The Province is fairly self-sufficient in normal years, so far as the supplies of millets are concerned. When seasons are unfavourable, small quantities of *Cholam* and *ragi* are imported from Hyderabad and Mysore.

(d) *Pulses.* The average anuual production of pulses is estimated at about 280 thousand tons against an estimated consumption of about 490 thousand tons. The deficit is met by imports from Burma, Sind, Bombay, United Provinces, the Punjab and Central Provinces.

Measures taken to meet the deficit. It is not impossible to produce the extra quantities of cereals to meet the deficit if people make an earnest effort to increase food production. The efforts so far made by the Government Departments to meet both the internal and external demand can be summarised under the following heads :—

I. *Extensive cultivation.* (a) In order to bring more area under cultivation concessions have been granted by the Government for cultivating free of assessment any unoccupied Government land on which crops have not been raised in *faslis* 1349 and 1350.

(b) The growing of vegetables and fodder crops in the back yards of houses free of charge to any extent has been permitted.

(c) The Revenue Department has been authorised to arrange for issue of temporary grants of railway porombokes for raising food crops.

(d) The cultivation of tank beds free of charge with dry crops is permitted.

(e) The early supply of irrigation water in Tanjore has enabled the conversion of about 57,000 acres of single crop lands into double crop lands. An additional production of not less than 32,000 tons of rice is expected.

(f) The early supply of water will enable the conversion of about 10,000 acres of dry lands in the Tanjore district into wet lands for raising a single crop of long duration paddy. If this is done, another 1,500 tons of rice more could be produced.

(g) With the early supply of water for irrigation, the *ryots* in the Pattukottai and Arantangi taluks of Tanjore district can raise a short duration *kuruvai* crop followed by a long duration crop or alternatively a long duration crop and then a short duration second crop with the water in the tanks.

(h) The *ryots* are being advised to improve the existing wells for irrigation or to dig new wells and to approach the Departments concerned for necessary help.

II. *Intensive cultivation of existing areas.* (a) For better cultivation the Agricultural Department is carrying on propaganda for the use of iron ploughs already in the market, clean cultivation and measures for the prevention of soil erosion. Advice is given for the improvement of alkaline lands.

(b) Propaganda is being done by the Agricultural Department for the extensive use of manures, the preparation and utilisation of wastes as composts and for the better preservation of cattle manure.

(c) The Agricultural Department has arranged the supply of manures like groundnut cake, bonemeal and fish manure.

(d) Green manuring for paddy is being advocated and the supply of green manure seeds like *kolinji*, sunhemp, *daincha*, etc. is arranged. Growing of green manure crops on channel bunds is being done.

(e) Seeds of better strains of paddy are being distributed to the *ryots* by the Agricultural Department. Four seed multiplication schemes sanctioned by Government, in co-operation with the Imperial Council of Agricultural Research, to cover in all about 10¾ lakhs of acres under improved paddy in two years' time were put in operation in June-July 1942.

If every cultivator gives up the local varieties of paddy and takes to improved strains it is quite possible to increase the average yield of paddy in the Province by at least 5 to 10 per cent

III. *Increased production of millets.* (a) Propaganda is being done to grow the maximum area possible under rainfed and irrigated millets. The extent of increased production possible is estimated to be about 415 thousand tons of grain.

(b) The growing of mixtures like cotton and *tenai* (*korra*), cotton and *ragi*, *cholam* or *cumbu*, groundnut and redgram, are being advocated where the practice is not in vogue.

(c) Wherever possible by judicious manuring and cultivation, the replacement of minor millets like *samai*, *panivaragu*, *varagu* and *kudiravali* by *cholam*, *cumbu* and *ragi* which will give a higher return per acre, is being advocated.

(d) Seeds of improved strains of *cholam*, *cumbu* and *ragi* are being distributed to the *ryots* by the Agriculture Department.

IV. *Increase of root crops and vegetables.* (a) Propaganda is being done to increase the cultivation of root crops like tapioca, sweet potatoes, colocasia, yams and vegetables in house compounds and vacant lands.

(b) Seeds and seedlings are being supplied at cost price from the Agricultural Research Stations.

(c) Government have sanctioned the free issue of vegetable seeds to schools.

(d) The area under potato in the Kodaikanals in the Madura district has been extended by arranging the supply of seed potato and opening up new lands for cultivation.

V. *Economising seed.* The *ryots* are advised to economise seed in raising paddy nurseries. The usual seed rate of 75 to 90 pounds could be reduced to 25 to 30 pounds per acre if the nurseries are properly raised according to the advice of the Agricultural Department The saving on this account in the Tanjore district alone is estimated at about 56,000 tons of paddy equivalent to 34,000 tons of rice. If this method of raising paddy nurseries is followed throughout the Presidency, it will go a long way to reduce the shortage of food grains. This low seed rate increases in addition, the crop yield.

VI. *Substitution of rice by millets.* Broken rice, which used to be imported from Burma and Thailand before the war and consumed by the poor classes of people, can to some extent be substituted by millets. Propaganda is being done in this direction.

VII. *Use of hand pounded or partially polished rice.* Propaganda is also being done to reduce waste consequent on the polishing of rice. The value of hand-pounded rice is being brought to the notice of the consumers.

VIII. *Financial help to the cultivators.* (a) Twenty lakhs of rupees have been provided by the Government to grant loans to the registered holders of the *ryotwari* holdings, to the *ryots* possessing occupancy rights of their holdings and to the tenants in Malabar who possess transferable rights in the land, at rates not exceeding Rs. 10 per acre of wetland and Rs. 5 per acre of dry land grown under food crops which was left uncultivated in *fasli* 1351. The Revenue Inspectors are authorised to grant loans which are repayable in two annual instalments.

(b) *Takkavi* loans continue to be given for the purchase of cattle, implements and seeds, and also for the improvement of lands.

(c) Loans are granted to the estates under the court of wards for the improvement or construction of irrigation works.

(d) Concessions have been granted for the cultivation of food crops, free of assessment for a period, in any unoccupied assessed government lands and unassessed and disafforested lands on which crops have not been raised in *faslis* 1349 and 1350.

Thus it will be seen that Government are making every endeavour by means of propaganda and several concessions to increase production and reduce waste in order to meet the internal and external demands for food grains. Government seek public co-operation in the matter. —*Director of Agriculture, Madras.*

Our Fruit Wealth*

To an average person many things become a commonplace due to close and prolonged contact. People entertain a fancy for a multitude of things from far off lands and are prepared to spend energy, time and money to procure them, even though they may with much less effort and cost obtain equally good or superior things from close quarters. This unaccountable attitude is as true in respect of our fruit supply as in most other things. Why should a man from Madras hanker after Kulu or Japanese apple when he has within his reach a less expensive and a more valuable fruit like mango? Why should we import a vast quantity of synthetic fruit drinks from distant lands, when we can prepare at a much cheaper cost more healthful drinks from our surplus fruits.

India has been growing fruits from times immemorial. This country has been the seat of origin of a large number of best fruits known—fruits which in many cases have attained a greater commercial importance in other countries of the world than in their original home. Even to-day there are thousands of people who never give a thought to the growing of fruits even though they possess all the favourable conditions for successful commercial fruit growing. Fruit is never considered a necessity in the South Indians' daily diet. No wonder therefore that, in spite of all our favourable conditions, we have yet to import fruits and fruit products from abroad, while many of our fruit growers receive little encouragement for growing more and better fruit due to uncertain demand and consequent low income.

But things must change; and they are changing. Our nutrition experts have brought home to us the value of fruit diet. There are very few foods which provide those invaluable and essential protective substances known as vitamins, as fruits. Both during peace and war times the part that fruit plays in maintaining human health and efficiency is being increasingly realized. A very large number of human ailments like scurvy, bad teeth, eye and nervous complaints, defective bone formation and a host of other lesser known diseases are traceable to the lack of vitamins in our food. These deficiencies are easily and inexpensively made up by regular and daily consumption of fruits, vegetables and milk. If only every person in this province includes in his or her daily diet the requisite quantity of fruits, our fruit-growing industry will have to expand several times the present size, making it as one of the leading national industries. Such a development has taken place in other countries, of which California stands out as a glaring example. There is no reason why we should not develop our fruit resources and wealth so as to bring about an improvement in our national health and wealth.

South India produces almost every variety of fruit known to the world, because of its diversity of soil and climatic conditions. It only needs the efforts of man to exploit these gifts of Nature. As a matter of fact, this part of India possesses certain advantages which permit the production of certain fruits at a cost below that considered possible in most parts of the world. Whereas in a highly horticulturally developed country like the United States of America the fruit growers have to spend enormous amounts every year on irrigation and frost protection, we in South India are in a position to produce equally good

* This note was delivered as a "talk" at the All India Radio Stations, Madras and Trichinopoly on 30th September and 3rd October 1942 respectively.

crops of certain fruits entirely under rainfed conditions without having to incur any expenditure on fighting the cold or on the installation of expensive irrigation systems. The question naturally arises as to why our fruit industry is still so backward in the face of these favourable features. Lack of realization of the value of fruit diet is obviously inadequate to explain this anomaly.

In the course of the present talk it is impossible to discuss all the factors that go to contribute to our present position of fruit growing. Suffice however to say that, apart from our lack of fruit consciousness, we in this country suffer from a series of disadvantages. Taking the case of a prospective fruit grower, it is found that he, at the very outset feels that he lacks the correct information in regard to the selection of sites for raising his orchard, the kinds and varieties of fruits which he should grow and the methods of orchard culture from the time of planting throughout the long life of his trees. Very often he finds that the plants he obtains for planting from a nurseryman are of inferior kind from the point of productivity and quality of fruit which they produce. If he succeeds in raising a large orchard of suitable fruits, he finds his surplus crop in most years a serious problem The effective methods adopted in other countries to meet such contingencies through organized scientific efforts and through the diversion of a bulk of the produce to canning and preservation factories are not at present within his reach. The frequent crop failures is a phenomenon to the solution of which he is unable to find the key. If he happens to be an absentee landlord or has only a passing interest in fruit growing, his enterprise suffers considerably in the ignorant hands of his servants.

Notwithstanding all these obstacles, fruit growing in South India has often proved to be a paying concern even though there are any number of orchards which have not given any profit inspite of their being located side by side with those which fetch high returns to the owners. It is obvious from the foregoing that unless and until fruit growing is considered a wholetime occupation of scientifically trained persons and unless and until research in fruit culture is extended and intensified to place at the disposal of every grower definite knowledge on every aspect of fruit culture, fruit utilization in every part of the province no substantial progress is possible. With these objects in view a real beginning has been made in this province in research of fruit growing. The officers of the Agricultural Department in general and specially those in the recently constituted Fruit Section are available for offering all the necessary advice for the development of our fruit industry. The growers are advised to seek their help and guidance and replace the present 'hit or miss' methods by scientific methods, which are the only way by which fruit industry can be built on firm foundation in the province. —*Director of Agriculture, Madras.*

Crop and Trade Reports.

Statistics—Ginger—1942—First forecast report. The area under ginger up to 25th August 1942 is estimated at 11,600 acres in Malabar and at 350 acres in South Kanara, as against 10,900 acres in Malabar and 600 acres in South Kanara estimated for the corresponding period of the previous year. The condition of the crop is satisfactory and the yield per acre is expected to be normal.

Statistics—Pepper—1942—First forecast report. The area under pepper up to 25th August 1942 in the district of Malabar and South Kanara is estimated at 104,500 acres (95,800 acres in Malabar and 8,700 acres in South Kanara), as against 105,900 acres (97,000 acres in Malabar and 8,900 acres in South Kanara) estimated for the corresponding period of the previous year. The yield per acre is expected to be normal.

The wholesale price of pepper per imperial maund of 82⅔ lb (equivalent to 3,200 tolas) as reported from important market centres on the 15th September 1942 was Rs. 22–5–0 at Calicut, Rs 23–1–0 at Tellicherry and Rs. 24–4–0 at Mangalore. When compared with the prices that prevailed on the 8th January 1942, these prices reveal a rise of approximately 128 per cent at Tellicherry, 109 per cent at Calicut and 80 per cent at Mangalore.

Statistics—Cotton—1942-43.—First forecast report. The average of the areas under cotton in the Madras Province during the five years ending 1940–41 has represented 9·7 per cent of the total area under cotton in India.

The area under cotton up to 25th July 1942 is estimated at 240,600 acres. When compared with the area of 167,200 acres estimated for the corresponding period of last year, it reveals an increase of 43·9 per cent.

Central districts and South.—mainly Cambodia tract. The area in the Central districts and the South represents generally the last year's crop left on the ground for second pickings before the plants are removed in September in compliance with the provisions of the Pests Act. The area in these districts rose from 143,300 acres to 165,900 acres due mainly to favourable rains in April and May 1942. The yield is expected to be generally normal.

Westerns tract. The area under Westerns rose from 9,200 acres to 59,700 acres. The increase in area in the current year is due mainly to the good rains received in the early part of the *mungari* season.

White and Red Northerns tract. The area under white and red Northerns rose from 1,700 acres to 5,500 acres.

Warangal and Cocanada tracts. The area under Warangal and Cocanadas cotton fell from 7,000 acres to 3,500 acres, i.e., by 50 per cent.

The average wholesale price of Cotton lint per imperial maund of 82⅔ lb. as reported from important markets on 3rd August 1942 was Rs. 19–12–0 for Cocanadas, Rs. 25–5–0 for white Northerns, Rs. 19–12–0 for red Northerns, Rs. 17–6–0 for Westerns (*mungari* crop), Rs. 22–8–0 for Westerns (*Jowari* crop), Rs. 42–13–0 for Tirupur Cambodia, Rs. 31–10–0 for Virudhunagar (Southern) Cambodia, Rs. 38–9–0 for Coimbatore *Karunganni*, Rs. 31–8–0 for Tinnevelly *Karunganni*, Rs. 23–6–0 for Tinnevellies and Rs. 29–15–0 for *Nadan* cotton.

Statistics—Cotton—1942-43.—Intermediate forecast report. *Last year's crop.* The yield of the second or summer pickings of the 1941-42 crop is estimated to be generally normal.

Current year's crop. The main season for sowing is not yet over in most parts of the Province. Sowings of the crop are in progress in the Circars, the Deccan and Coimbatore. The condition of the early sown crop is reported to be generally satisfactory.

The average wholesale price of cotton lint per imperial maund of 82⅔ lb. as reported from important markets on 7th September 1942 was Rs. 19–12–0 for Cocanadas; Rs. 23–12–0 for white Northerns; Rs. 16–7–0 for red Northerns; Rs. 19–6–0 for Westerns (*Mungari*), Rs. 24-6-0 for Westerns *(Jowari)*, Rs. 42-4-0 for Tirupur Cambodia, Rs. 37–1–0 for Coimbatore *Karunganni*, Rs. 29–6–0 for Tinnevelly *Karunganni*, Rs. 22–3–0 for Tinnevellies and Rs. 29–2–0 for *Nadan* cotton. When compared with the prices that prevailed on 3rd August 1942, these prices reveal a rise of approximately 12 per cent in the case of Westerns (*Mungari*) and eight per cent in the case of Westerns *(Jowari)* and a fall of approximately six per cent in the case of white Northerns, 17 per cent in the case of red Northerns, one per cent in the case of Tirupur Cambodia, four per cent in the case of Coimbatore *Karunganni*, seven per cent in the case of Tinnevelly

Karunganni, five per cent in the case of Tinnevellies and three per cent in the case of *Nadan* cotton, the price remaining stationary in the case of Cocanadas.
(*Additional Joint Secretary Board of Revenue, Madras.*)

Cotton Raw, in the Madras Presidency. The receipts of loose cotton at presses and spinning mills in the Madras Presidency from 1st February to 16th October 1942 amounted to 615,151 bales of 400 lb. lint as against an estimate of 563,800 bales of the total crop of 1941-42. The receipts in the corresponding period of the previous year were 585,874 bales. 537,145 bales of which more than half represents loose cotton were received at spinning mills and 2,592 bales were expofted by sea while 82,158 bales were imported by sea mainly from Karachi and Bombay. (*Director of Agriculture, Madras.*)

Statistics—Crop —Groundnut —1942—Third forecast report. The average area under groundnut in the Madras Province during the five years ending 1940-41 represents 44·9 per cent. of the total area under groundnut in India.

The area sown with groundnut up to 25th September 1942 is estimated at 2,799,200 acres. When compared with the area of 2,076,500 acres estimated for the corresponding period of the previous year, it reveals an increase of 34·8 per cent.

The increase in area is general outside Kistna, Tanjore and Tinnevelly and is due chiefly to the prevalance of high prices during the main sowing season. The increase is marked in Vizagapatam (62,000 acres), Kurnool (98,000 acres), Bellary (105,000 acres), Cuddapah (50,000 acres), South Arcot (75,000 acres) and North Arcot (90,000 acres).

The summer crop throughout has been harvested. The yield was normal except in parts of South Arcot where it was reduced on account of drought. The yield of the early crop was normal in Salem and Coimbatore.

The condition of the main crop is reported to be satisfactory outside Guntur, Bellary, Anantapur and Salem where it was affected by drought to some extent. In parts of Chingleput, Coimbatore and Trichinopoly, the crop suffered in some degree from attacks by insect pests.

The wholesale price of groundnut (machine shelled) per imperial maund of 82⅔ lb as reported from important market centres on the 5th October 1942 was Rs. 8—14—0 in Coimbatore, Rs. 8—9—0 in Vizianagaram, Rs. 7—15—0 in Vellore Rs. 7—7—0 in Guntur, Cuddalore and Tadpatri, Rs. 7—6—0 in Nandyal, Rs. 7-5-0 in Salem, Rs. 7—4—0 in Vizagapatam and Hindupur, Rs. 7—0—0 in Adoni and Cuddapah and Rs. 6—14—0 in Bellary. When compared with the prices published in the last report, i. e., those which prevailed on the 10th August 1942 the above prices reveal a rise of approximately ten per cent. in Vizianagaram, four per cent. in Salem, two per cent. in Vellore, one per cent. in Nandyal and Bellary and a fall of approximately ten per cent. in Cuddappah, 9 per cent in Adoni and 3 per cent in Vizagapatam, the prices remaining stationary in Guntur and Cuddalore.

Statistics—Crop—Gingelly—1941-42—Second report. The average area under gingelly in the Madras Province during the five years ending 1940-41 represents 16·0 per cent of the total area under gingelly in India.

The area sown with gingelly up to the 25th September 1942 is estimated at 490,500 acres. When compared with the area of 435,400 acres estimated for the corresponding period of last year, it reveals an increase of 12·7 per cent. The increase in area is generally due to the prevalence of high prices for gingelly during the sowing period.

The estimated area shows a considerable increase over that of last year in the Central Districts, particularly in Salem and Trichinopoly, where the increase

is said to be due to the higher prices obtainable. There is also a noticeable increase in Anantapur. There has been a decrease in the estimated area in the Circars where it is most marked in the East Godavari District and then the decrease seems to have been due to a failure of the rain.

The early crop of gingelly has been harvested in parts. The yield per acre was normal except in Vizagapatam, South Arcot, North Arcot and Ramnad and in parts of Coimbatore.

The main crop of gingelly has been affected to some extent by drought in Anantapur, Nellore, Salem and Tinnevelly. The condition of the crop is fairly satisfactory in the other districts of the Province.

The wholesale price of gingelly per imperial maund of 82⅔ lb. as reported from important markets on the 5th October 1942 was Rs. 12—3—0 in Trichinopoly, Rs. 11—8—0 in Tuticorin, Rs. 11—5—0 in Cuddalore, Rs. 11—3—0 in Salem, Rs. 10—15—0 in Ellore, Rs. 10—9—0 in Cocanada, Rs. 9—8—0 in Vizagapatam and Tinnevelly and Rs. 9—4—0 in Vizianagaram. When compared with the prices published in the last report, i. e. those which prevailed on the 10th August 1942, the prices reveal a rise of approximately 26 per cent in Ellore, 19 per cent in Vizianagaram and Tinnevelly, 17 per cent in Cocanada, 16 per cent in Salem, 11 per cent in Trichinopoly, ten per cent in Cuddalore and nine per cent in Tuticorin. (*Additional Joint Secretary, Board of Revenue, Madras.*)

Estate News and Notes.

Students' Corner. The College was reopened after the Michaelmas holidays on Monday the 5th October.

The tour of the III year students in October had to be given up this year due to transport difficulties. Instead, short week-end tours have been programmed.

Games. *Cricket.* Our college team played three matches during this month in the Rhondy Shield Tournament. The first was on 10th October against the Victoria College, Palghat. The visitors were all out for 89 while our team scored 106 for 3, (C. N. Babu—34, Kothandaraman—21, C. Ramaswami—18 and H. Shiva Rao—16). Kothandaraman's bowling was very effective, and he bagged 8 wickets for 29 runs.

The second match was played on 12—10—42, against the Coimbatore Cricket Club. The college team scored 174 runs (C. Ramaswami—78 and Chengappa—30), while the visitors scored 112 for 5, with the result, the match ended in a draw.

The third match was against the Government Arts College, Coimbatore, and was played on the 17th October. In the first innings the visitors collapsed for a paltry score of 20 runs; Madhava Rao and Krishnan bowled well, each bagging four wickets. Our team scored 132 (Muthukumarappa—41 and Shanker Rao—20). In the second innings, the visitors scored 43 for the loss of three wickets.

The final inter-class match for the Victory Cup was played on the 18th October between the I year and the III year classes, and the latter won. The III year having won in Hockey also are the winners of the Victory Cup this year.

Hockey. An exciting match was played against the Victoria College, Palghat, on our grounds, on the 11th October which ended in a draw, each side scoring a goal.

M. Sc. degree. We offer our hearty congratulations to Mr. M. Balakrishnan Nayar, B. Sc. (Ag.), who has been awarded the M. Sc. degree by the Madras University, for his thesis on the "Investigations on the Economics of Rice cultivation in Malabar."

Officers' Club—Club Day. The Annual Club Day of the Agricultural College Officers' Club, which used to be usually held on the penultimate Saturday in October, was this year held from the 7th to the 10th October. On the 7th the members were entertained at Tea by the Executive Committee of the Club and this was followed by "Progressive Pairs" Bridge tournament. The Annual Dinner was on the 8th night, and on the 9th evening field sports, children's races and elders' events were conducted, which was followed by a light Tea. On the 10th evening, prizes were distributed to the winners in the various events by the President of the Club, Mr. H. Shiva Rao, and this was followed by a variety entertainment, which was much appreciated.

The following is a list of prize winners in the major events :—

Items.	*Winners.*	*Runners up.*
1. Tennis (singles) (C. Ramaswami Cup)	R. Veeraraghavan	C. N. Babu.
2 Tennis (Doubles) (Rao Bahadur G. N. Rangaswami Ayyangar Cup)	R, Veeraraghavan & A. K. Annaswami	M. C. Cherian & M. Adeni.
3 Contract Bridge (N. L. Dutt Cup and K. Ramiah Cup)	S. R. Raju & T. V. Reddy	E. J. Verghese & G. K. Narayana Iyer.
4. Contract Bridge (Padmanabha Shield League Match) (Donor of shield—T. S. Ramasubramania Ayyar)	T. V. Reddy & K. Santhanam	T. S. Ramasubramaniam & M. S. Kylasam.
5. Duplicate Bridge	V. S. Sankaran A. K. Nambiar K. S. Subba Rao & K. V. Gopala Ayyar	T. V. Reddy K. Santhanam L. S. Mani & S. R. Raju.
6. Progressive Bridge—N—S	T. S. Ramasubramaniam & E. S. Kothandaraman	K. Krishna Menon & T. S. Lakshmanan
E—W	G. K. Chidambaram & A. K. Nambiar	P. D. Karunakar & S. R. Raju.
7. Table Tennis (Singles)	C. H. Krishnan	S. Varadarajan.
8. Table Tennis (Doubles)	N. M. Naidu & T. S. Francis	R. Veeraraghavan & S. V. Parthasarathy.
9. Tennekoit (Dr. K. Narayanan Cup)	A. K. Nambiar & M. Kelukutty Menon	Ibrahim & M. Adeni.
10. Carrom (Singles) (K. Krishnamurthi Rao Cup)	S. Varadarajan	M. Meenakshisundaram.
11. Carrom (Doubles) (Shiva Rao Cup)	C. H. Krishnan & M. Meenakshisundaram	N. K. Sundaresan & M. Adeni.
12. Chess (M. U. Vellodi Cup)	E. J. Verghese	Dr. S. V. V. Rajan.
13. Volley Ball	R. Veeraraghavan's Team	K. S. Subba Rao's Team.
14. Dick	I. S. Varadarajan, II. Abdul Samad, III. G. K. Chidambaram, IV. C. Balasubramaniam & V. K. Santanam.	

Scouting. The Estate Scouts had a day's camp on the 16th August 1942. At the close of the camp, there was a camp fire which was very enjoyable. The Ramakrishna Scout Group celebrated their "Annual Group Day" on 6th September 1942 with Rao Bahadur Dr. T. S. Tirumurthy, Retired Principal of

the Stanley Medical College, Madras, presiding. A very large gathering of ladies and gentlemen was present and the displays given by the boys were very much appreciated.

For the year commencing with 1st September 1941 the following gentlemen have been elected to the Group Committee:— The Principal, Agricultural College (ex-officio President), C. M. John (Vice-President), C. R. Srinivasa Ayyangar, S. V. Doraiswami, L. Krishnamurthy Rao, V. Mahadevan, Dr. K. Narayanan, T. Sadagopa Ayyangar, S. Kalyanasubrahmaniam, R. Ratnam, U. V. Gopalakrishna Rao and T. S. Lakshmanan (Secretary).

Visitors. Mr. H. M. Hood, Adviser to H. E. the Governor of Madras and Mr. P. H. Rama Reddy, Director of Agriculture, Madras, visited the Agricultural College and Research Institute and the Malt Factory in the first week of the month.

Departmental Notifications.

Gazetted Service.

Leave.

Gulam Ahmed Sahib Bahadur, Officiating District Agricultural Officer, on leave is granted l. a. p. for 4 months on m. c. from 26—6—42.

Saadat ul-lah Khan Sahib Bahadur, Dy. Director of Agriculture extension of leave on half average pay for 3 months from 22—9—42.

Sri K. Raghava Acharya, J. L A. and Asst. Supdt., Central Farm, Coimbatore, extension of l. a. p. on m. c. for 2 months and half average pay for 1 month.

Subordinate Service.

Transfers.

Name	From	To
Sri D. Bapayya,	A. D. Bapatla,	F. M. A. R. S. Guntur.
„ P. Sudarsanam Nayudu,	F. M. A. R. S. Guntur,	A. D. Gurzala.
„ G. L. Narasimha Rao,	A. D. Repalli,	A. D. Bapatla.
„ M. C. Menon.	A, D. Cannanore,	F. M. A. R. S. Nanjanad.
„ C. Raman Moosad,	F. M. A. R. S. Nanjanad,	A. D. Cannanore.
„ K. R. Nagarajan,	Asst. in Entomology, Coimbatore,	Asst. in Oil Seeds, A. R. S. Tindivanam.
„ M. Subramania Chetty,	Asst. in Cotton, Cocanada's Cotton Scheme, Narasaraopet,	F. M. D. F. S. Hagari.
„ A. Shanmugasundaram,	F. M. A. R. S. Pattukottai,	F. M. A. R. S. Koilpatti.
„ P. Gopalakrishnan,	F. M. A. R. S. Koilpatti,	F. M. A. R. S. Pattukottai.
„ T. R. Naganatha Ayyar,	Sub Asst. in Botany, Coimbatore,	Asst. in Fruits, Botanical Gardens and Orchards, Coimbatore.
„ M. P. Narasimha Rao,	Asst. in Cotton. A. R. S. Guntur,	Asst. in Cotton, A. R. S. Nandyal.
„ N. G. Narayana,	Asst. in Cotton, A. R. S. Nandyal,	Asst. in Cotton, D. F. S. Hagari.
„ M. Venkoba Rao,	Asst. in Cotton, D. F. S. Hagari,	Asst. in Cotton, A. R. S. Guntur.
Muhammad Fasiuddin Sahib,	F. M. D. F. S. Hagari,	Asst. in Cotton, Mungari Cotton Scheme, Adoni.

Leave.

Name	Period of leave.
Sri J. Suryanarayana, A. D. Gurzala,	L. a. p. on m. c. for 3 months from the date of relief.
,, M. K. Gopalan, A. D. Trivellore,	L. a. p. on m. c. for 4 months from 27–9–42.
,, P. Naghadhara Naidu, F. M. Nandyal,	L. a. p. on m. c. for 4 months from 18–8–42.
,, P. K. Natesa Ayyar, A. D. Rasipuram,	L. a. p. for 1 month from 17–10–42.
,, R. Narasimha Ayyar, A. D. in Mycology, Saidapet,	L. a. p. for 3 months from 5–10–42.
,, N. Krishna Pillai, A. D. Pollachi,	L. a. p. for 1 month from 1–10–42.
,, P. Lakshminarayana, F. M. Samalkot,	L. a. p. for 1 month from 26–9–42.
,, S. Ramaswami Raju, Sub Asst. in Botany, Coimbatore.	L. a. p. for 4 months from 19–10–42.
,, T. V. Rangaswami, Asst. in Cotton, Coimbatore,	L. a. p. for 2 months and 27 days from 28–9–1942.
,, S. Mayandi Pillai, Asst. in Cotton, A. R. S. Nandyal,	L. a. p. for 1 month and 23 days from 2–11–42.